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the local fauna, and later to the formation of small loan collections which can be used by teachers in their class rooms.

ACCORDING to *Cosmos*, a new alpine meteorological observatory will be established on the summit of the *Rochers de Naye*. The arrangements are now being made by MM. Ruffy and Hagenbach Bischoff, of Bâle, members of the Swiss Meteorological Commission.

THE Middletown Scientific Association held a meeting on October 13th, at which suitable notice was taken of the death of G. Brown Goode, the founder of the Association.

As announced some time since, Miss Helen Kellar, who, blind, deaf, dumb, has now reached the age of sixteen years, has been removed from a school for the deaf and dumb, and has been placed in Mr. Gilman's Cambridge School for Girls. It is not correct, as stated, in many of the daily papers, that she has entered Radcliffe College or passed the examinations for this, but in a private examination she showed herself competent to answer the questions of examination papers in English, French, German and history.

AT the Church Congress (Church of England) which met at Shrewsbury, on October 6th, a session was set apart for the discussion of the bearing of the theory of evolution on Christian doctrine. The Bishop of Litchfield presided, and addresses were made by Archdeacon Wilson, Prof. Bonney and Canon Gore. There seems to have been complete unanimity. Canon Gore said, 'Evolution had taken hold of theology; it had modified our way of thinking about it.' Archdeacon Wilson said, "Christian doctrine could adopt the evolutionary view of creation," that the theory of evolution had taught us to properly interpret "what was related as 'The Fall' *sub specie historiæ*."

WE have already called attention to the formation of the New York State Science Teachers' Association, whose object is the promotion of science teaching and the mutual acquaintance of those interested. A provisional committee has been appointed to conduct the affairs of the Association until the first annual meeting, which will probably be held during the Christmas holidays in connection with the State Principals' Association at Syracuse. All

those interested in the teaching and promotion of science should join the Association and make efforts to attend its first meeting. The officers are: Simon H. Gage, President; Chas. W. Hargitt, Vice-President; Franklin W. Barrows, Secretary and Treasurer (45 Park St., Buffalo, N. Y.).

THE Chicago Institute of Education has appointed a committee of sixty whose duty it shall be to develop some feasible plan for carrying on systematic outdoor, or field work, in connection with nature study. The committee held its first meeting on September 19th, and a permanent organization was effected by the election of Mr. Wilbur S. Jackman as President and Mrs. M. L. T. Baker as Secretary, and the appointment of a number of sub-committees. One of the first works of the committee will be the preparation of maps of the environs of Chicago, which will assist the pupils and teachers of the public schools in a systematic study of the country which lies within a convenient radius of the city. Syllabi will also be compiled giving information for reaching the different points of interest and for study.

#### UNIVERSITY AND EDUCATIONAL NEWS.

ACCORDING to the Boston *Transcript* the registration at Harvard University is about 3,590, of which number 1,260 are new names. There is a slight decrease in the college, but an increase of about 10 per cent. in the scientific school. There is also an increase in the graduate and medical schools. In the latter 50 per cent. of the students hold college degrees, as compared with 35 per cent. last year.

MR. GEORGE M. WARD has been elected President of Rollin's College, Winter Park, Fla.

DR. R. MEADE BOLTON, now bacteriologist of the Philadelphia Board of Health, has been elected instructor in bacteriology in the University of Missouri.

It is reported that the University of Edinburgh has conferred the degree of M. A. on two women graduates, Miss MacGregor and Miss Geddes.

At the University of Cambridge Mr. W. T. N. Spivey, of Trinity College, has been appointed to succeed Dr. A. Scott as demonstrator to the Jacksonian professorship of organic chemistry.

The lectureship in chemical physiology is vacant by the resignation of Dr. A. Sheridan Lea, F. R. S., on account of ill health.

PROF. BUBNOF, of Dorpat, will succeed Prof. Erismann in the chair of hygiene in the University of Moscow. Dr. S. Bianchi has been appointed full professor of anatomy at Vienna, and Dr. B. Boccardi associate professor of microscopical anatomy in the University at Naples.

#### DISCUSSION AND CORRESPONDENCE.

##### COMPARISON BETWEEN THE USE OF FIXED AND MOVABLE CIRCLES, IN THE DETERMINATION OF DECLINATIONS BY MERIDIAN CIRCLE.

ONE advantage claimed for the use of a movable circle is, that it tends to eliminate the effect of graduation errors.

This effect will not be entirely eliminated by any number of changes in the position of the circle; but considering it as one of the sources of accidental error, the mean of a large number of observations will be affected by the mean of the errors of graduation for the increased number of divisions.

The relation of this error, to that due to other conditions, should also be considered; and in establishing the advantage of using the movable circle, in so far as graduation errors are concerned, one should be confident that no other sources of error are introduced.

In dealing with instrumental errors it is undoubtedly sounder policy to arrange observations so that they may be eliminated, rather than to determine the effect of such errors and correct for them.

But this policy refers to errors that can be actually eliminated, and without introducing others of unknown character or amount. Where both methods may be used, actual elimination of error, and, its determination and subsequent correction, the advantage is recognized, in the knowledge thus gained of the general laws governing errors and their correction.

In the case of a fixed circle the instrument is a homogeneous one throughout a series of observations, which may extend over many years. The laws of flexure may be studied by consecutive determinations, as part of a united series;

and, in general, the performance of the instrument can be investigated, under the varied conditions arising from extended use, with the certainty that some errors are truly systematic in character.

With a movable circle there is the advantage of variation of conditions, which may produce results nearer the truth, in the average, by absence of certain systematic errors.

It will always be a matter of judgment based upon experience, whether one can deal better with results affected by systematic errors, or with observations in which they are replaced by accidental ones.

In practical observing one method is usually adopted for general work. While there are other conditions that may determine which method will be used, a comparison of their respective accuracy is not without interest, using such material as may have a bearing upon such a test.

For the purposes of illustration the probable error of graduation, for the mean of four divisions, may be assumed to be  $\pm 0''.15$ , the value obtained in the measurement of the  $1^\circ$  arcs, of the Repsold Meridian Circle of the Lick Observatory. If this error were entirely accidental, throughout, a reading made upon two adjoining divisions should have a smaller error; but as there appears to be evidence of a periodic character in the graduation, this value may be adopted for the present comparison.

Representing by  $g$  the probable error due to graduation, for the general case of a measure of zenith distance we should have to consider the error of the Nadir reading, and  $g$  would be  $\pm 0''.21$ .

With a fixed circle, however, if the value of the latitude, used in determining star declinations, is that obtained by observations of standard stars with the same instrument, the graduation error of the Nadir reading is actually eliminated from the results. Or, if when the instrument is reversed the same divisions come under the microscopes at the Nadir reading, the graduation error of those divisions is then eliminated from the measurement of any particular zenith distance in both positions. Under these conditions, the probable error  $g$  of a determination of a star's declination, by means of reading on